Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

SOUTH AMERICAN TIMBER RESOURCES AND THEIR RELATION TO THE WORLD'S TIMBER SUPPLY*

By **RAPHAEL ZON**
U. S. Forest Service

The forest resources of South America are very great, but just how great no one at present can tell, for vast areas known to be forested are as yet entirely unexplored. Therefore any estimates must necessarily be in the nature of very rough approximations, which later explorations and surveys may entirely upset. On the basis of the information now available, the total forest area of South America may be placed in the neighborhood of 3,000,000 square miles (7,787,000 square kilometers, or 1,924,000,000 acres). By countries, this area may be distributed roughly as follows:

TABLE I—FOREST AREAS OF SOUTH AMERICA BY COUNTRIES (GENERAL TABLE)

COUNTRY	FOREST AREA IN SQUARE MILES	MILLION ACRES	FOREST AREA PER 100 INHABITANTS IN SQUARE MILES	FOREST AREA IN PER CENT OF TOTAL LAND AREA
Argentina	231,000	147	3.0	20
Bolivia	284,000	181	12.0	55
Brazil	1,541,000	988	9.0	48
Chile	59,000	38	15.0	15
Colombia	241,000	155	5.0	55
Ecuador	145,000	93	10.0	67
Guiana	64,000	40	3.0	29
Paraguay	84,000	54	10.0	80
Peru	176,000	112	10.0	25
Uruguay	No forests of commercial importance			
Venezuela	181,000	116	7.0	45
Total or Average	3,006,000	1,924	8.0	38

The commercial value of these vast forests is still very little known. Botanically, the South American forests, particularly those near the equator and along the river bottoms, consist of a large number of species. "On a single acre it is hardly possible to find two or three trees of the same kind." This botanical wealth of species can not be used as a measure, however, of commercial value. The reasons for the widespread use of wood are its lightness, combined with strength, and the ease with which it can be worked. It is these qualities that make wood almost indispensable to our civilization. What is demanded, especially in the international markets, is a light, strong, easily workable timber which can be supplied in large quantities and delivered at a low price. Such timber has so far been supplied by the northern coniferous and temperate hardwood forests of Europe and North America. The richest forests in the world commercially, those of northern Russia and Sweden, botanically are very poor. They consist of only two species—the Scotch pine and the spruce.

---

* Read on January 3, 1916, before Section III of the Second Pan-American Scientific Congress, Washington, D. C.

If the South American tropical forests contain only a few commercially useful tree varieties which are scattered among a large number of other species of low or no present commercial value at all, the high cost of logging them may make the exploitation of such forests unprofitable. As a matter of fact, this has been exactly the case with nearly all of the tropical forests until recently. The few trees known at present as commercially valuable are invariably found scattered among a great many unutilizable ones. In order to cut and remove the valuable species it is necessary, therefore, to cut and leave a good deal of useless material. A more intimate study within recent years of the physical properties of tropical woods by the United States foresters in the Philippines has shown, however, that the forests of the Philippine Islands and the Malay Archipelago contain a vast group of trees (*Dipterocarpa*) which, although they are hardwoods, possess many of the qualities of the common woods used in international trade, namely, lightness, strength, and softness. The presence of a large number of utilizable woods in other tropical forests, in addition to the rare woods, such as dye woods, rosewood, mahogany, and others, would place them on an entirely new commercial basis, since they would contribute to the future supply of common hardwood timber for the world.

If further studies show that the forests of South America contain, in addition to the rare dye woods, *quebracho,* greenheart, mahogany, etc., a large number of utilizable hardwoods similar to *cedro,* which is already being exported from there, the economic importance of the South American forests will be great. Our present knowledge of the technical properties of the woods of the South American forests is very inadequate. From what we do know at present, however, there are only three species which, because of their technical properties, may furnish woods suitable for wide use. These are the Paraná pine (*Araucaria brasiliensis*) and the Chilean pine (*Araucaria imbricata*), two coniferous species, and the Spanish cedar, or *cedro* (*Cedrela,* several species), which is a soft hardwood. Most of the other hardwoods known at present are exceedingly hard and heavy and, therefore, difficult to saw. How hard they are may be judged from the fact that sawmill machinery manufactured in the United States especially for sawing hardwoods in South America and guaranteed in advance to cut 20,000 feet of hardwoods daily has, in innumerable tests, developed a maximum capacity of only 7,500 feet a day.

The following is an attempt to estimate very roughly the areas occupied by the different classes of South American woods and on the basis of these estimates to outline the possible economic importance of South American forest wealth. The total forest area of 1,924,000,000 acres may be divided into distinct forest regions (map, Fig. 1) according to the prevailing commercial species: (I) the coniferous forest, comprising (1) stands of nearly pure Paraná pine and (2) stands of Chilean pine mixed with some larch, cedar, and South American beech, which may be designated as the Antarctic beech region; (II) the vast hardwood forest which comprises (3) the tropical hardwood forest, in which Spanish cedar is invariably present, and (4) the forest of subtropical hardwoods; (5) stands in which *quebracho* forms the important species, and (6) stands in which greenheart predominates.

1. The Paraná pine forest region[1] occupies an area of approximately 309,000 square miles, or 200,000,000 acres (802,000 square kilometers), the greatest part in the southeastern portion of Brazil in the states of Rio Grande do Sul, Santa Catharina, Paraná, São Paulo, southern Minas Geraes, and Matto Grosso. The range of this pine is between the parallels of 18° and 32° S. It derives its name from the state of Paraná in Brazil, where it is most plentiful and is commercially the most important tree. In Paraná one company alone owns a solid forest, much of which is still in the primitive state, aggregating 3,000,000,000 feet and averaging over 4,000 feet to the acre. Some stands of Paraná pine contain as much as 15,000 or 20,000 board feet to the acre.

2. The Antarctic beech region[2] is the only other region in which conifers are found, such as the Chilean pine, larch, and cedar. The Chilean pine is botanically very close to the Paraná pine. This region lies chiefly on the slopes of the Andes and occupies in all an area of approximately 96,000 square miles (61,000,000 acres), or 248,000 square kilometers.

3. The tropical and subtropical hardwoods[3] occupy by far the largest areas. The tropical hardwoods are found over an area of some one and a half million square miles (more than one billion acres), and the subtropical hardwoods over an area of 259,000 square miles (165,000,000 acres). The most valuable tree of the tropical hardwood forest is the *cedro*. *Cedro* (*Cedrela odorata* and other species) constitutes one of Brazil's most important export hardwoods and is commonly known in the United States as Spanish cedar. This species does not form pure forests over large areas but is found scattered among the tropical hardwoods throughout Brazil from the Amazon to the Paraná River. The largest and highest-grade logs are cut from the forests in the state of São Paulo and in the territory lying south and immediately west of it. In this portion of Brazil the wood is in high favor commercially and is consumed in large quantities. Its softness, the ease with which it can be worked, its ability to

---

[1] R. E. Simmons: Lumber Markets of the East Coast of South America, *Bur. of Foreign and Domestic Commerce Special Agents Series No. 112*, Washington, 1916. [Information with regard to the rest of the continent is to be found in the same writer's "Lumber Markets of the West and North Coasts of South America" in the same series, No. 117. Both of these reports are abstracted in the "Geographical Record" in this number.—EDIT. NOTE.]

[2] Bailey Willis: Northern Patagonia, Vol. 1 and atlas. Published for the Ministry of Public Works, Argentine Republic, by Charles Scribner's Sons, New York, 1914.

[3] Theodore Roosevelt: Through the Brazilian Wilderness, Scribner, New York, 1914.

Raphael Zon: The Forest Resources of the World, *Forest Service Bulletin 83*, U. S. Dept. of Agriculture, 1910.

hold paint and take a polish, as well as its high grade, commend it for many special uses and make it first in economic importance of all the Brazilian hardwoods. It enters aggressively into competition with the imported pines and in certain markets is preferred for a number of uses. In Brazil it is being cut annually at the rate of about 47,000,000 board feet. Its range coincides practically with that of the tropical hardwoods. Of the vast variety of other hardwoods which are found in mixture with cedar, *peroba* and *acapu* (*Voucapoua americana*) are the two species which may be considered among the chief woods for export from the Amazon Valley to the European markets. At any rate, these species, more than any other hardwoods, meet locally the need for hardwoods and, therefore, make unnecessary the importation of American and European hardwood lumber.

4. The hardwoods in which *quebracho*[4] forms the commercially important species are found chiefly in northern Argentina, in the provinces of Tucumán, Santiago del Estero, and Santa Fé, the territories of Formosa and the Chaco, and in the Chaco of Paraguay. Botanically, however, *quebracho* is distributed over a much larger area. The total possible yield from the forest areas where *quebracho* occurs in commercial quantities is estimated at 168,000,000 tons, while the present yearly consumption of the wood for all purposes is a little less than 1,000,000 tons. Since the average yield per acre is approximately two tons of the wood, the total forest area in which *quebracho* occurs in commercial quantities is about 84,000,000 acres. The small yield per acre makes it necessary to cut over about 500,000 acres annually in order to secure the 1,000,000 tons of wood which are in demand. *Quebracho* wood is one of the principal commercial products of South America, its main value being for tannin extract and cross ties.

5. Greenheart (*Nectanda rodioei*),[5] with which is associated mora (*Dimorphandra mora*), is the most important tree of British Guiana, the only place where it is being cut extensively. There it is found most abundantly along the Essequibo, Demerara, and Berbice Rivers. Greenheart grows along the seacoast and watercourses, seldom extending more than 50 miles inland and never more than 100 miles. It reaches its best development in a strip of country between two and three miles wide immediately behind the alluvial deposit which fringes the seacoast. The present export of timber from British Guiana is in the neighborhood of 200,000 cubic feet, which, on the whole, is smaller than it was in the past, when in certain years as much as 400,000 cubic feet were exported. Greenheart is chiefly used in ship and dock building because of its immunity against the ravages of the *terado*. It is found over a range of over 240,000 square miles, or about 154,000,000 acres (625,000 square kilometers).

---

[4] C. D. Mell: Quebracho Wood and Its Substitutes, *Forest Service Circular 202*, U. S. Dept. of Agriculture, Washington, 1912.

[5] C. W. Anderson: Forests of British Guiana: General Report on the Forests of the Easily Accessible Districts of the Colony. Dept. of Lands and Mines, Georgetown, Demerara, 1912.

The following tables (Tables II and III) and map (Fig. 1)[6] show in detail the different forest areas and their location:

TABLE II—FOREST REGIONS OF SOUTH AMERICA

	SQUARE MILES	MILLION ACRES	SQUARE KILOMETERS
Tropical hardwoods	1,613,000	1,032	4,177,805
Paraná pine	309,000	200	801,611
Subtropical hardwoods	259,000	165	670,761
Greenheart-mora forest	241,000	154	624,785
Mahogany forest	84,000	54	218,672
Quebracho forest	404,000	258	1,045,627
Chilean pine-beech forest	96,000	61	247,557
Total	3,006,000	1,924	7,786,818

From this very inadequate survey of the commercially valuable timber resources of South America as we know them now, it may be seen that the real forest wealth of South America is not as great as one would naturally think from the vastness of the forest area, particularly if one bears in mind that the commercial forest does not occur in a solid body over the entire area and that a great deal of it has already been destroyed. Thus in Chile, according to Federico Albert,[7] Inspector General of Forests, Hunting, and Fisheries, the commercial forest area has now been reduced to 5,000,000 acres. Of the 39,000,000 acres classed as woodland, 9,000,000 are pasture forest, 18,500,000 only firewood forest, 6,000,000 furnish only poles and stakes, leaving only about 5,000,000 acres of really commercial forest.

That light, strong, and easily workable timber is the one that is most in demand even in South America is shown by the fact that in Argentina 80 per cent of the total annual consumption of lumber is imported from the United States, Canada, and Europe, and consists chiefly of pine and spruce, while the native hardwoods make up only about 10 per cent. The same is true of Uruguay. In Brazil, where the forest area of hardwoods is very large, 40 per cent of the total consumption is covered by importations of pine and spruce from the United States, Canada, and Europe, 30 per cent is supplied by the native pines, and the remaining 30 per cent is made up of the native hardwoods. In Chile, the third in importance of the South American republics, 55 per cent of the total wood consumption is covered by American and European importations and 45 per cent supplied by the native woods.

It is true that of the 47,000,000 board feet of Paraná pine which is cut annually in Brazil, about 15,000,000 board feet is exported; yet at the same time the United States, Canada, and Europe are sending pine to Brazil, largely for similar uses, in quantities averaging over four times this amount. An analysis of the export and import lumber trade of the whole of South America (see Table IV) shows a condition similar to that in Brazil. Thus, while the importations of lumber in 1912 amounted, exclusive of naval stores, to about $32,000,000, the export of wood, exclusive of rubber, was a little over $9,000,000. Of this, over half was *quebracho* extract logs. The amount of actual wood exports, therefore, was not more than $4,500,000, or about one-seventh as much as the wood imports. It is evident that at present the large forest area of South America does not even supply its home demand for soft, easily workable wood commonly used in general construction work. So much for the coniferous softwoods.

---

[6] In preparing the map, the boundaries of the several forest regions have been determined by W. H. Lamb, in charge of investigations on forest distribution in the Forest Service.

[7] Federico Albert: The Forests of Chile, *Monthly Bull. of Agric. Intelligence and Plant Diseases*, Vol. 5, 1914, pp. 1535-1541, Internatl. Inst. of Agric., Rome.

As far as hardwoods are concerned, the present annual cut is almost sufficient to cover the home demand; consequently very little hardwood timber is imported into South America from the United States, Canada, or Europe. Judging from the figures available for Brazil, Uruguay, and Argentina, the native hardwoods form only about 15 per cent of the total amount of wood used in South America, a rather insignificant amount.

At present the lumber industry of South America is still in a primitive condition. The inaccessibility of the forests, the absence of means of transportation, the lack of capital, and the sparseness of the population are undoubtedly responsible. The logging of tropical woods, even with improved methods, will always be a costly operation. Unless all of the mature trees in such a forest are marketable—a condition which can hardly be expected—the valuable species will always be found more or less scattered. To log them, therefore, will involve large expense of cutting roads to where the trees are felled. Furthermore, the tropical hardwoods are, as a rule, cumbersome to handle on account of weight. Not infrequently as many as 40 oxen are required for the transportation of one log. According to some estimates by large logging operators, it would cost $16.80 to haul 1,000 board feet for a distance of 12½ miles. As is mostly the case in all new countries, the public service transportation is expensive in Brazil. A railroad running through one of the most important forest sections charges about $15.90 per thousand feet American log scale for transporting logs a distance of 100 miles. Even in the Paraná pine region, where the timber occurs in almost pure stands, one of the sawmills with a steam-power logging road and modern power skidding and logging machinery figures the cost of logs delivered on skids at the mill at $10.50 per thousand feet, not including stumpage.

The lumber industry is working under many difficulties and is confined to a few species. This explains largely such an apparently anomalous situation as that lumber from native woods is undersold in nearly every important market by high-grade imported lumber, in spite of the fact that the native forests are only from 100 to 300 miles from the points of consumption, while the foreign lumber must be shipped from 4,000 to 5,000 miles and bears an import duty of 100 per cent ad valorem. These difficulties,

TABLE III—FOREST AREAS OF SOUTH AMERICA BY COUNTRIES (DETAILED TABLE)

	PER CENT OF TOTAL FOREST AREA	MILLION ACRES	SQUARE KILOMETERS	AREA PER 100 INHABITANTS IN SQ. KMS.
Argentina				
Chilean pine-beech-cedar forest	15.8	23	94,307	
Subtropical hardwoods	2.9	4	17,682	
Quebracho forest	81.3	120	485,681	
Total forest area	100.0	147	597,670	8.0
Bolivia				
Tropical hardwoods	51.2	93	376,050	
Subtropical hardwoods	17.7	32	129,672	
Quebracho forest	31.1	56	228,693	
Total forest area	100.0	181	734,415	29.1
Brazil				
Tropical hardwoods	76.9	760	3,076,769	
Paraná pine forest	20.3	200	801,611	
Quebracho forest	2.8	28	113,169	
Total forest area	100.0	988	3,991,549	23.0
Chile				
Chilean pine-beech-cedar forest	100.0	38	153,250	
Total forest area	100.0	38	153,250	4.4
Colombia				
Greenheart-mora forest	5.7	9	35,365	
Mahogany forest	26.4	41	165,037	
Subtropical hardwoods	39.6	61	247,557	
Tropical hardwoods	28.3	44	176,826	
Total forest area	100.0	155	624,785	12.3
Ecuador				
Tropical hardwoods	64.2	60	241,662	
Subtropical hardwoods	22.6	21	84,878	
Mahogany forest	13.2	12	49,510	
Total forest area	100.0	93	376,050	25.1
Guiana				
Greenheart-mora forest	89.3	36	147,354	
Tropical hardwoods	10.7	4	17,682	
Total forest area	100.0	40	165,036	7.2
Paraguay				
Quebracho forest	100.0	54	218,084	
Total forest area	100.0	54	218,084	25.7
Peru				
Tropical hardwoods	63.3	71	288,816	
Subtropical hardwoods	36.7	41	167,395	
Total forest area	100.0	112	456,211	9.9
Uruguay				
No forests of commercial importance, the whole country being essentially an extension of the great Argentine plain.				
Venezuela				
Greenheart-mora forest	94.1	109	442,066	
Subtropical hardwoods	5.0	6	23,577	
Mahogany forest	.9	1	4,125	
Total forest area	100.0	116	469,768	17.0

however, are being gradually overcome. The lumbering of the Paraná pine is already on a fairly solid basis and is making rapid progress. It is being developed largely by American lumbermen. At first, without fully understanding the properties of the Paraná wood, they had trouble in handling it; but gradually, as men of more technical training become interested in its manufacture and the problems connected with its kiln-drying are worked out in a practical way, an increasingly greater utilization of the timber is definitely assured. Even now in some states it is the

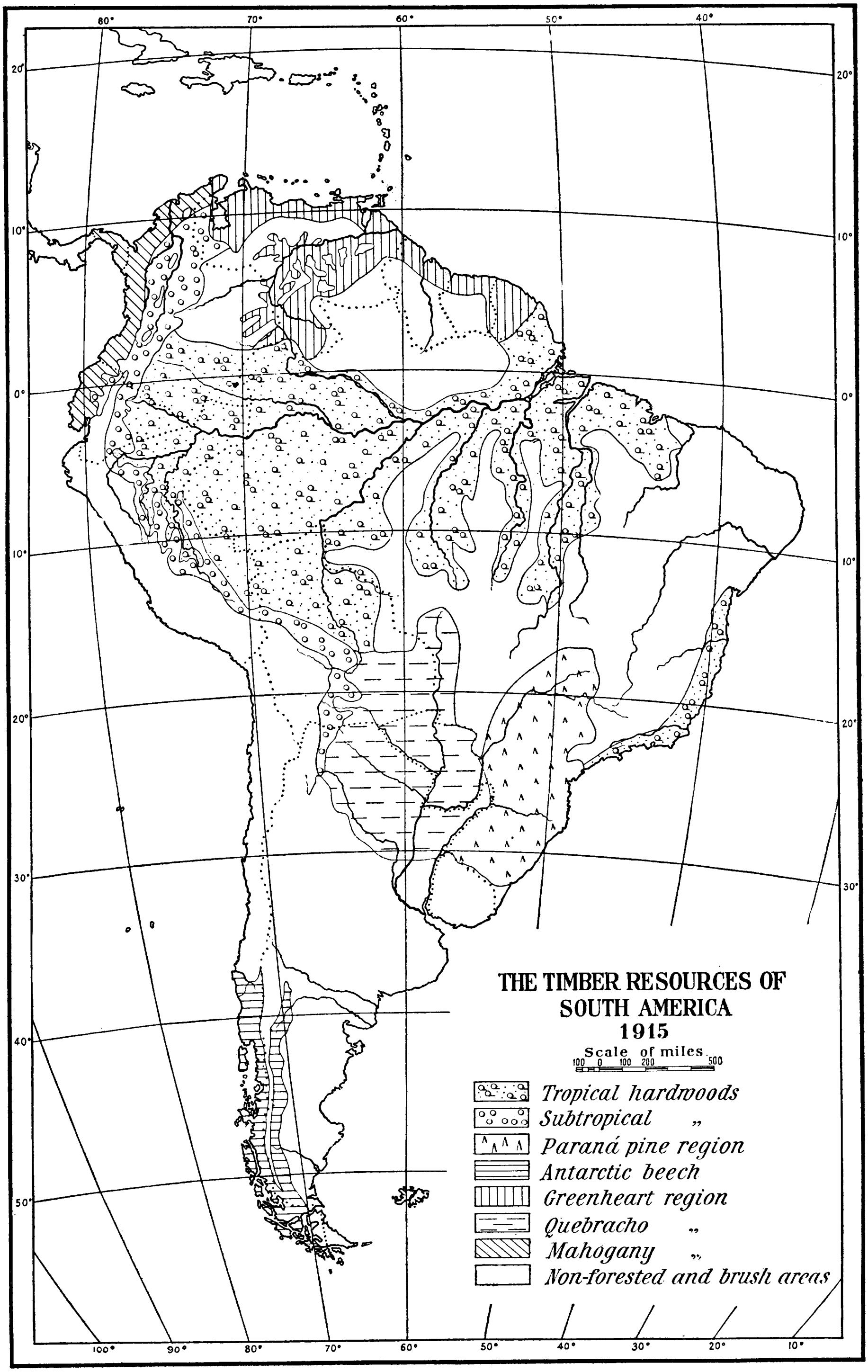

FIG. 1—Map of the commercially valuable forest regions of South America. Scale, 1:50,000,000. The boundaries of the forest regions were determined by W. H. Lamb of the U. S. Forest Service.

TABLE IV—IMPORT AND EXPORT LUMBER TRADE OF SOUTH AMERICA, 1912*

(values in dollars, United States currency)

IMPORTS

	FURNITURE	PINE UNPLANED	WOOD		ROSIN	PINE BLOCKS AND BOARDS	STAVES AND HOOPS	ROUGH, SAWED, PLANED, AND VENEERED	LUMBER AND WOODS	TURPENTINE	MATCHES	TOTAL LUMBER	NAVAL STORES
			UNMFG.	MFG.									
Argentina..	2,668,230	13,984,340	......	......	......	......	......	......	......	......	......	16,652,570	....
Bolivia.....	130,702	......	248,087	75,794	......	......	......	......	......	......	......	454,583	....
Brazil......	871,002	......	......	......	1,593,017	2,768,805	186,883	464,835	......	......	......	4,291,525	1,593,017
Chile.......	......	1,331,773	......	......	......	......	......	......	......	......	......	1,331,773	....
Colombia..	......	......	......	......	......	......	......	......	317,401	......	......	317,401	....
Ecuador...	......	......	......	......	......	......	......	......	94,594 [a]	......	26,917	121,511	....
Guiana													
British..	.....	......	......	......	......	......	......	......	3,846,701	......	......	3,846,701	....
Dutch...	......	......	......	......	......	......	......	......	......	......	......	....	....
French..	......	......	......	......	......	......	......	......	......	......	......	....	....
Paraguay..	4,835 [b]	......	......	......	......	......	......	......	......	......	......	4,835	....
Peru.......	171,631 [c]	......	......	......	......	......	......	......	1,765,916 [c]	......	......	1,937,547	....
Uruguay...	258,841 [c]	......	......	......	......	......	......	......	2,680,597 [c]	......	......	2,939,438	....
Venezuela.	......	......	......	......	......	......	......	......	......	8,879	......	....	8,879
Total..	4,105,241	15,316,113	248,087	75,794	1,593,017	2,768,805	186,883	464,835	8,705,209	8,879	26,917	31,897,884	1,601,896

[a] Rough and finished. [b] Only U. S. reported. No figures for other countries. [c] 1911.

EXPORTS

	QUEBRACHO		TIMBER	WOOD AND LUMBER	BALSAM COPAIBA	QUILLAYA BARK	BALSAM TOLU	TOTAL
	EXTRACT	LOGS						
Argentina..	4,667,570	3,443,655	......	......	......	......	......	8,111,225
Bolivia....	......	......	......	......	......	......	......	......
Brazil......	......	......	......	......	......	......	......	......
Chile.......	......	......	......	......	......	9,287 [a]	......	9,287
Colombia..	......	......	68,572	15,289	5,910 [a]	......	19,488 [a]	109,259
Ecuador...	......	......	......	......	......	......	......	......
Guiana								
British..	......	......	62,830	......	......	......	......	62,830
Dutch...	......	......	......	9,839 [b]	......	......	......	9,839
French..	......	......	......	......	......	......	......	......
Paraguay..	......	......	846,341	......	......	......	......	846,341
Peru.......	......	......	......	......	......	......	......	......
Uruguay...	22,747 [b]	......	......	......	......	......	......	22,747
Venezuela..	......	......	......	72,439	38,658	......	......	111,097
Total..	4,690,317	3,443,655	977,743	97,567	44,568	9,287	19,488	9,282,625

[a] Exported to United States. No figures for other countries. [b] 1911.

* From "Commercial Relations of the United States with Foreign Countries, Calendar Year 1912," Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, 1914.

most formidable competitor of Scotch pine, American spruce, and white pine for box making. In southern Brazil it successfully replaces the American yellow pine for doors, flooring, blinds, and ceiling. There seems, therefore, to be very little doubt that in Paraná pine South America has a softwood which can successfully take the place and thèrefore compete with the softwoods imported from the United States, Canada, and Europe, and that with the greater development of the native lumber industry the importation of the softwoods to South America will gradually decrease and that eventually she will be able to supply her own demand for this kind of timber.

The limited area, however, of these pine forests, together with the fact that South America is still a young country which will have to provide wood for a much larger population than she has now, makes it very doubtful that even with the proper protection and management she will ever become an exporter of softwoods to foreign markets. With regard to hardwoods, however, South America, in spite of the difficulties of primitive methods in logging, is already capable of satisfying practically all of her needs and is even exporting, in addition to extract and dye wood, some of the rarer woods. The vast hardwood forests of South America could undoubtedly be a source of large supplies of tropical hardwoods for interior finish for the world market, if it were not for the fact that the demand for heavy tropical woods will always be limited, and even the use of dye woods is probably coming to an end shortly because of the progress made with chemical dyes. Furthermore, the weight of the tropical woods and the distance from markets will always be a serious obstacle in delivering such woods on a large scale at reasonable prices, especially at a time when wood is coming more and more into competition with wood substitutes. Therefore, unless the South American hardwoods are to be manufactured on the ground and exported as veneer or other partially manufactured product or the cost of logging and transportation is greatly reduced, they will hardly ever become a source of great export.

If our estimates of the timber resources of South America are anywhere correct, several conclusions suggest themselves:

First, in spite of apparently a vast forest area, the extent of commercially really valuable timber is limited, and therefore it would be an obvious error to assume that the timber resources of South America are inexhaustible. The people of the United States have made a similar error in the past. Twenty years ago the white pine in Michigan was regarded as inexhaustible; today 6,000,000 acres which thirty years ago carried the best white pine in the world have been abandoned by their owners for taxes and lie almost wholly waste—a man-made desert, the combined result of a reckless use of the axe and a still more reckless disregard of fire. As it is, attention has already been repeatedly called to the danger of the extinction of the *quebracho,* since little or no check has been placed on the cutting of this wood. If the present cutting is permitted to continue, according to a very high Argentine authority, few existing *quebracho* trees will be left standing. There is constant outcry for the passing of immediate forestry laws, but as yet this very pressing matter has not obtained its share of consideration from Congress. Not only the *quebracho,* but many other valuable species of trees with which the forests abound are in danger of extinction in the not very distant future as the result of inadequate forestry laws.

Second, the coniferous softwoods of South America will supply only the growing home population, and, therefore, their preservation becomes a matter of national importance, since with the gradual exhaustion of the timber supply of the northern and temperate regions the amount of softwood exported will gradually decrease and the price increase.

Third, South America has a vast amount of hardwoods which is more than sufficient to supply her own needs for all time; but, as far as we know at present, it has comparatively few hardwoods beside Spanish cedar and several extract and dye woods which may figure extensively in export trade. This vast hardwood forest is still unknown and furnishes a fertile field for exploration which may lead to the discovery of many species whose wood properties may change entirely the commercial aspect of the South American forests. The first task, therefore, of South American countries which are interested in the development of their forests is a thorough reconnaissance of their timber resources and a study of the technical properties of the different woods as a basis for an intelligent estimate of what those forests contain and what they have to offer to the lumber market of the world. If further study fails to discover any more valuable species than those already known it will still serve as a basis for a definite forest policy. It will indicate methods of logging and partial manufacture which may make possible a large export trade in these hardwoods. It may show the advisability of confining future management of those forests to the growth of only the most valuable species and the gradual elimination of the vast number of unutilizable trees or forest weeds. Such a policy, together with the rapid growth of the tropical trees, may tend to increase the commercial value of the forests. It may also dictate a definite land policy with regard to the clearing of certain kinds of forests for agricultural purposes and the advisability of retaining others for timber growth. Without such a reconnaissance and determination of the possible uses to which the tropical hardwoods are suited, a systematic and intelligent development of the timber resources can not be undertaken nor capital for their exploitation readily attracted. It is therefore in the interest of the countries whose economic progress depends on the development of their natural resources that such a reconnaissance should be undertaken and carried through as soon as possible.